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AGRICULTURAL MEMORANDUM 525

by Dr M Hough

Weather Factors Affecting Rape Cultivation in Britain

The cultivation of rape for oil is now economically more attractive than in previous years. Only a small acreage of oil seed rape has so far been cultivated in Britain (16,000 acres in 1968) and this note is an attempt to summarise the weather factors which could be important for the crop.

Nearly all counties grow a few acres of oil seed rape, but by far the largest concentration is in central southern England and the south east Midlands from Hampshire to Northamptonshire. This pattern seems to have arisen out of the need for a break crop in areas of continuous cereal growing. A processing plant in Hampshire helped the production in that area.

Rape Plants

Rape is a member of the cabbage family and two commercial varieties are grown:

a. Winter Rape. (Brassica napus var. oleifera subvar. biennis)

This is sown in August/September and plants enter the winter as a rosette of leaves. The size of the plants varies with sowing date and growing conditions after sowing. Winter rape requires vernalisation by cold before reproductive growth is possible. This cooling requirement is small and early sown crops can initiate flowers in November, but December or January is the more normal time. As spring advances the plants bolt and flowering occurs in April and May by which time they have reached 4-5 feet in height. The pods grow during May and June, and by July they are ready to harvest.

b. Spring Rape. (Brassica napus var. oleifera subvar. annua)

Spring crops are sown in March and germination and emergence proceeds when the soil temperature at seed depth rises above 5°C. After 10 or 12 leaves have been produced flowers are initiated which subsequently open in June. Pods grow in July and the crop is harvested in late August and September.

Spring sown plants are usually smaller and less branched than autumn crops, and as a result the yields are lower. The oil content of the seed is also less: 38-42% for Spring rape, 42-48% for Winter rape.

Turnip rape (Brassica campestris) occupies an extremely small acreage in Britain, but is more popular in Europe and Canada since it can survive the cold winters well.

Weather factors and Winter rape

Seedbed Preparation

Winter rape would normally follow a cereal crop harvested in August. In the absence of rain in August this crop will have removed the available water in the top soil layer. In this case preparation of the soil to make a sufficiently fine seedbed requires some rainfall, and seed germination would require further rain. One possible way to assess the climate risks here is to use a bare soil evaporation model to estimate the date when the top 10cm of soil is back to field capacity and then to estimate the number of workdays available for preparation and sowing in the remaining part of September.

Overwintering

Research in Sweden has shown that damage to rape occurs when the plant temperature falls below about $-12^{\circ}C$, while plant temperatures below $-18^{\circ}C$ are lethal. A deep snow cover gives good protection, but can cause fungus disease problems. Such cold weather is rare in Britain, but winter weather such as that experienced in 1947 and 1963 would cause some plant losses. In these two winters the coldest part of Britain was the east Midlands from Norfolk and Suffolk westwards to Northamptonshire. In 1963 Shropshire and Gloucester were as cold as the Midlands. Small or tender plants are more susceptible to cold than others. Small plants are normally produced by late sowings and tender growth could be due to excessive nitrogen in the seedbed, too early a sowing or too narrow a row width. Small plants are also susceptible to frost heaving when cold weather follows rain.

Waterlogging in late winter can also kill plants.

Spring Frost

Air temperatures of -2 to $-3^{\circ}C$ which occur when the flowers are just opening can damage them and reduce yields. 1972 was serious in this respect since warm, sunny weather in March brought on the flowers and was followed by frost in April. Frost damage could be avoided by siting the rape fields on hills rather than in valley bottoms.

Wet, cold weather is bad for pollination.

Harvest

Dry, sunny weather during the last stage of pod maturation makes for an easy harvest. A popular method is to windrow the crop after it has been cut so as to dry it in the field. Damp, wet conditions would be unfavourable at this stage and may cause yield losses due to premature germination and sprouting.

Weather Factors and Spring Rape

Sowing

Similar problems are encountered when sowing rape or spring cereals. A dry spell is needed for successful sowing and it must be expected that wet Springs will force the sowing into April. Spring rape does not appear to have a long day requirement for flowering so that a late sowing should not be as detrimental to rape yields as it is for spring sown cereals.

Pod Growth

Hot, sunny weather at this stage is known to reduce pod growth and yield. Also, the oil content of the seed builds up faster and reaches a higher level under cool conditions with the temperature below 25-30°C. This would appear to be another main reason why Spring crops give lower yields than Autumn crops.

Harvest

Spring rape is normally combined directly and then artificially dried. The harvest would be hampered by wet weather particularly if the crop was late in maturing due to delayed sowing or a poor summer growing season. The climate risks could be assessed by the number of available work days in September suitable for harvest operations.

Fertiliser

Autumn sown crops are given N, P, K in the seedbed and the plants take all the P and K they need by December. A further N application in February/March helps the plants through the flowering stage. Excess winter rain may be important for determining the Spring nitrogen application. Spring crops receive fertiliser in the seedbed, but further applications may be necessary if April is very wet.

Several workers have commented on the high sulphur requirement of the crop and boron appears to be an essential trace element, but these are not meteorological problems.

Pests and Diseases

Pollen beetle and seed weevils attack the crop, but the chemical control of these pests is well established. Pigeons are a significant local hazard. Low temperature fungi are important in Sweden and Finland, but would presumably be unimportant in Britain. Stem rots are known in Central France and could be a potential hazard here. Rape plants are also host to sugarbeet eelworm and so care is required if rape is grown in rotation with sugarbeet.

Any comments or criticisms should be sent direct to the author.

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